

# Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

**2018 ANNUAL REPORT**



**NOAA**  
**FISHERIES**

# Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

## 2018 ANNUAL REPORT

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*Please note: Data in this report are considered to be preliminary, and may be revised as better information becomes available. For the most current data, please contact the NMFS Pacific Islands Regional Office.*

*Cover image: Black-footed albatross*

*Black-footed albatross with a petrel.*

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# 1. Introduction

The National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) is responsible for minimizing, as practicable, interactions between Hawaii pelagic longline fishing operations and seabirds. NMFS monitors the fisheries to determine the effectiveness of management measures implemented to minimize interactions and the severity of interactions. NMFS documents interactions and mitigation efforts aboard vessels at sea, and reports annually on fishing effort, seabird interactions, and mitigation research.<sup>1</sup> [View this report, and similar reports from previous years online.](#)

## 1.1 Background

NMFS and the Western Pacific Fishery Management Council (WPFMC) manage two Hawaii pelagic longline fisheries under the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific (FEP) and implementing regulations. The deep-set longline fishery targets primarily bigeye tuna at depths to 400 m and operates mainly north-northeast and southwest of the main Hawaiian Islands (Fig. 1). The shallow-set longline fishery targets swordfish at depths to 100 m and typically operates north and east of the Hawaiian Islands (Fig. 2). The FEP contains a detailed description of the two fisheries (WPFMC 2009, as amended).

Since 1994, the Hawaii longline fleet has been limited to 164 permits; a permit allows fishing in both fisheries, shallow- and deep-set. Activity levels in any given year since 2004 range from 11 to 35 vessels in the shallow-set fishery, and 111 to 142 vessels in the deep-set fishery. Nearly all vessels in the shallow-set fishery also participate, to some degree, in the deep-set fishery during the year.

Laysan albatross, black-footed albatross, shearwaters, fulmars, boobies, and the endangered short-tailed albatross feed around the Hawaiian Islands in areas where the longline fisheries operate. During the deployment (setting) and retrieval (hauling) of

longline fishing gear, hooks and line may occasionally hook or entangle seabirds that attempt to take bait or catch. Seabirds are more likely to drown when the interaction occurs during setting because the weight of the gear may pull the seabird underwater. Although some interactions are inevitable, fishermen take steps to avoid and minimize interactions. By using safe handling and release techniques, fishermen help many seabirds survive their interactions.

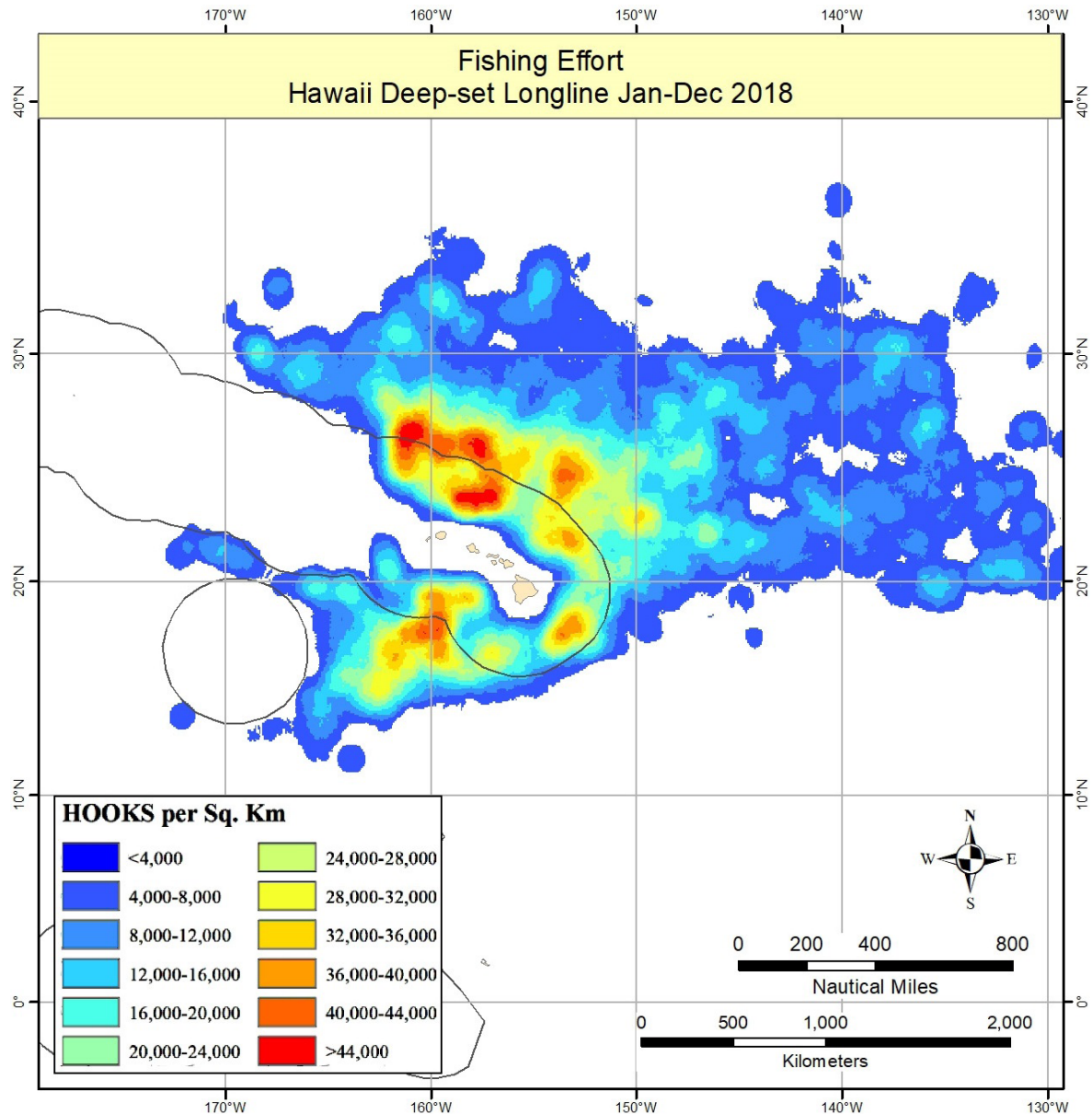
Effective management of the fisheries has greatly minimized interactions with seabirds. In 2000, NMFS estimated 2,433 seabird interactions in the Hawaii longline fisheries. From 2001 – 2006, NMFS implemented seabird mitigation measures. These measures have reduced interactions and are described in Section 1.2.

NMFS places observers on every shallow-set longline trip, resulting in 100% coverage. In 2018, there were nine observed interactions in the shallow-set fishery. NMFS places observers on approximately 20 percent of deep-set trips. For the 2018, we expanded the observed interactions and estimated 1,139 interactions in the deep-set fishery. Credit for this successful reduction in interactions is mostly due to the fishermen, who understand and implement the seabird mitigation measures. The measures include training in seabird identification, seabird-deterrent fishing gear and techniques, and special handling and release of incidentally-caught seabirds.



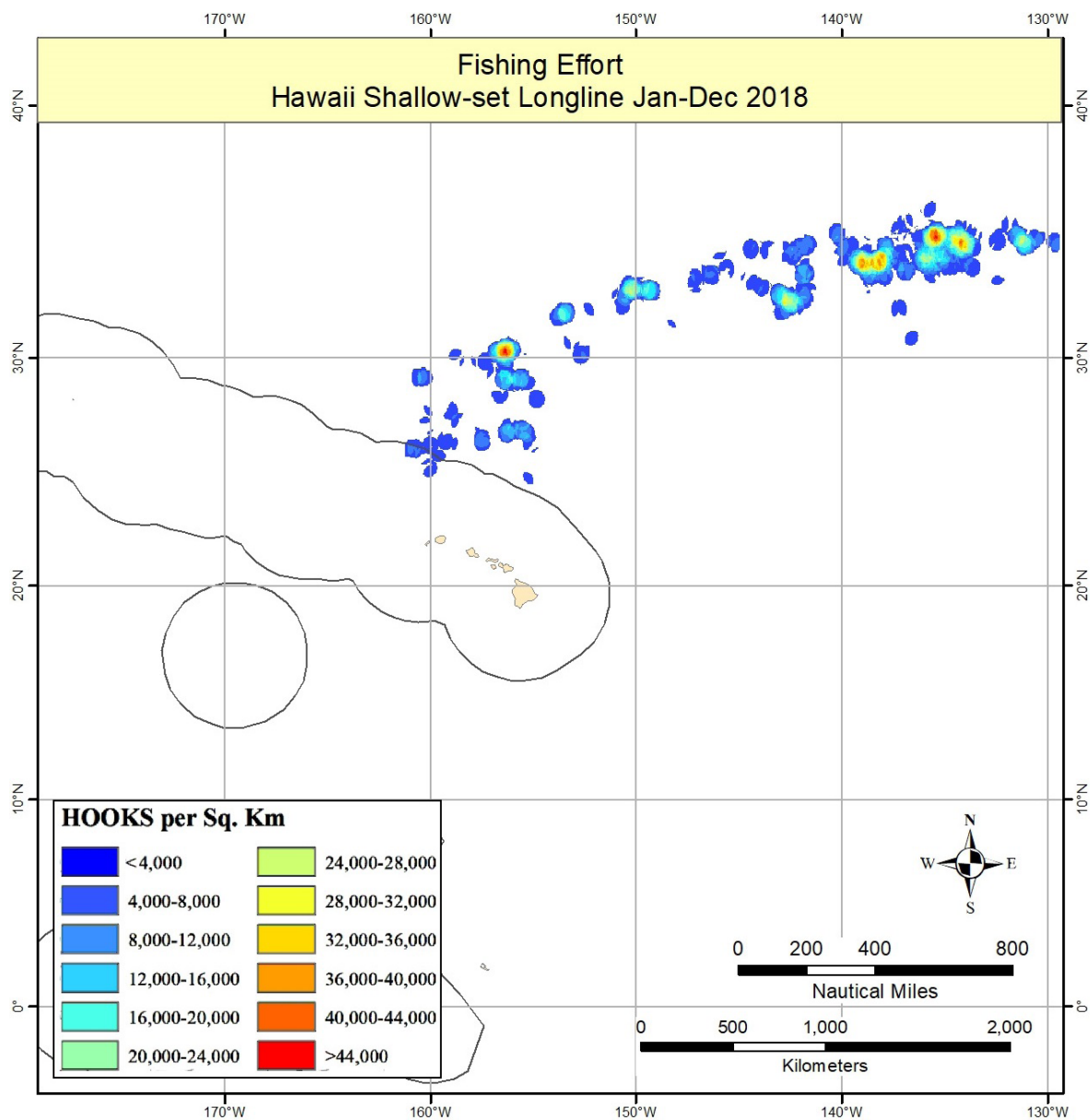
*Red-footed booby.*

<sup>1</sup>This annual report is required in the Terms and Conditions of the 2012 Biological Opinion of the U.S. Fish and Wildlife Service for the operation of Hawaii-based Pelagic Longline Fisheries (USFWS 2012).



**Figure 1.** Spatial distribution of fishing effort by the Hawaii deep-set longline fishery, 2018.

Source: NMFS Pacific Islands Fisheries Science Center (PIFSC) logbook, unpublished data, received 1/27/2020.



**Figure 2.** Spatial distribution of fishing effort by the Hawaii shallow-set longline fishery, 2018.

*Source: NMFS PIFSC logbook, unpublished data, received 1/16/2020.*

## 1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries

Most of the regulations for Hawaii longline fisheries are identified in Title 50, Code of Federal Regulations, Parts [600](#) and [665](#) (50 CFR Parts 600 and 665). NMFS also provides a [regulation summary and compliance guides](#) to Hawaii longline fishermen and the general public, available from <https://www.fisheries.noaa.gov/pacific-islands/resources-fishing/regulation-summaries-and-compliance-guides-pacific-island-fisheries>.

Regulations specific to the mitigation of seabird interactions and safe handling techniques are at 50 CFR 665.815. The ways that fishermen implement required seabird mitigation measures depend on how and where fishermen fish. Mitigation measures to reduce seabird interactions differ between the two options of stern-setting and side-setting. The following sections describe each of the main gear and operation requirements. The 2012 Biological Opinion (USFWS 2012) also describe these measures.

### Side-Setting

Side-setting involves deploying the gear from the side of the vessel, compared to the conventional method of setting from the stern. In side-setting, crewmen set baited hooks forward and close to the side of the vessel's hull where seabirds are unable or unwilling to pursue the hooks. With required branch line weighting, by the time the vessel stern passes the location where baited hooks have been set, the baited hooks will have sunk to a depth where seabirds cannot reach them (Gilman and Brothers 2006; Gilman et al. 2005, 2007a, 2007b). Additionally, deploying a required bird curtain aft of where crew is deploying the gear inhibits seabirds from landing on the water along the side of the vessel where baits are accessible.

Table 1 summarizes the number of Hawaii deep- and shallow-set vessels observed to set from the stern and from the side in 2018, with some vessels operating in both deep- and shallow-set longline fisheries. In 2018, most vessels in the deep-set fishery and all but one vessel in the shallow-set fishery chose to stern-set.

**Table 1.** Number of observed Hawaii longline vessels that side- and stern-set in 2018.

Fishery	Deck setting position	Vessels
Deep-set	Stern-setting	109
Deep-set	Side-setting	24
Shallow-set	Stern-setting	11
Shallow-set	Side-setting	0

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 7/24/2019.

### Weighted Branch Lines

Fishermen place weights close to the hook on branch lines so baited hooks sink quickly and help prevent foraging seabirds from possibly becoming hooked or entangled in longline gear. To sink the branch lines quickly, Hawaii longline fishermen must attach a weight of at least 45 g within 1 m of the hook in the following situations: deep-setting from either the stern or the side north of 23° N, and shallow-setting from the side anywhere. Fishermen commonly use weights from 45 to 80 g.

### Thawed and Blue-dyed Bait

Dyeing bait to a specific blue color reduces visibility by reducing contrast with the sea surface. Fishermen thaw the bait to increase sink rates and to allow a more effective penetration of the blue dye. Almost all bait used in the Hawaii longline fisheries consists of the fusiform fishes mackerel (saba), sardines, and saury (sanma). NMFS prohibits the use of squid bait in the shallow-set fishery to reduce sea turtle interactions. While fishermen may still use squid in the deep-set fishery, the squid bait costs more than some fish bait and is, thus, less preferred.

### Strategic Offal Discards

Fishermen developed the technique of strategically discarding offal to distract seabirds from attempting to steal baits from hooks before the branch lines are retrieved. Fishermen discard swordfish heads and livers on the opposite side of the vessel from fishing operations to distract birds away from the baited hooks. NMFS observers in the mid-1990s noted that strategically discarding offal reduced incidental hooking or entanglement of albatrosses, and it is now



a requirement<sup>2</sup>. When seabirds are present around the vessel, fishermen that are stern- and deep-setting north of 23° N., or stern- and shallow-setting anywhere, are required to use strategic offal discards as a seabird mitigation measure when setting from the stern.

## Night-Setting

Night-setting as a seabird mitigation measure requires shallow-set fishermen, when stern-setting, to start deploying gear no earlier than one hour after local sunset and complete the set no later than the following sunrise. The measure also requires using the minimum lighting necessary to conform to navigation rules and best safety practices. The night-set measure is based on the premise that seabirds cannot see baited hooks in the dark and, thus, do not attack them. Night-setting has been a very effective seabird mitigation measure, reducing seabird interactions as much as 98% (McNamara et al. 1999, Boggs 2003). Table 2 summarizes the seabird mitigation requirements.



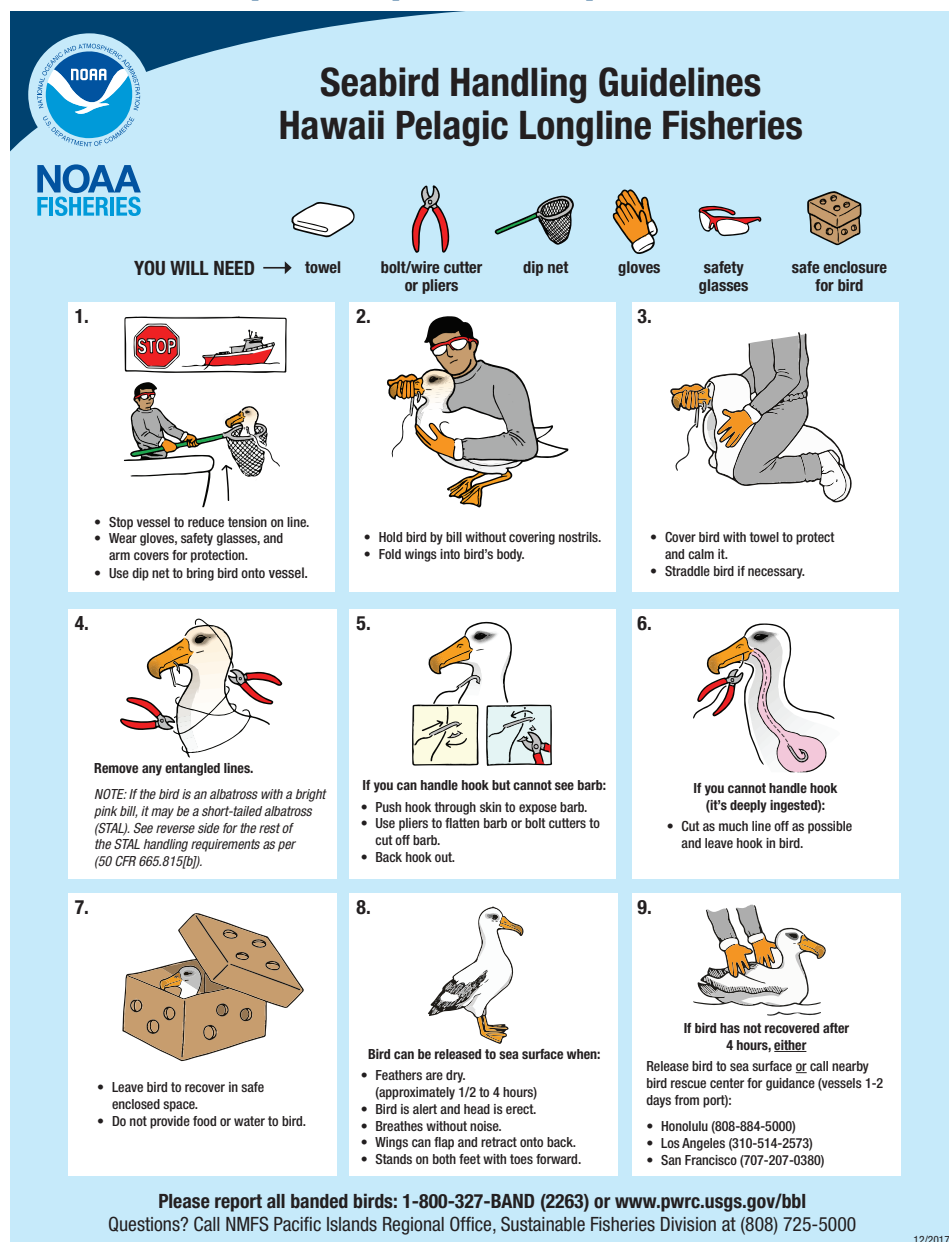
*Bird curtain that has been deployed to prevent seabirds from landing on the water where bait is accessible.*

**Table 2. Seabird mitigation requirements for the Hawaii longline fleet.**

What you need to do	Stern-setting		Side-setting	
	Shallow-Set Anywhere	Deep-Set North of 23° N	Shallow-Set Anywhere	Deep-Set North of 23° N
Deploy mainline from port or starboard side at least 1 m forward of stern corner	-	-	Yes	Yes
If line shooter is used, mount it at least 1 m forward from stern corner	-	-	Yes	Yes
Use a specified bird curtain aft of the setting station during the set	-	-	Yes	Yes
Deploy gear so that hooks do not resurface	-	-	Yes	Yes
Attach 45 g or heavier weights within 1 m of hook of each hook	-	Yes	Yes	Yes
Use a line shooter to set the mainline	-	Yes	-	-
Keep two 1-pound containers of blue-dye on boat	Yes	Yes	-	-
Use completely thawed and blue-dyed bait	Yes	Yes	-	-
Keep fish parts and spent bait with all hooks removed for strategic offal discard	Yes	Yes	-	-
Cut all swordfish heads in half, and use heads and livers for strategic offal discard	Yes	Yes	-	-
Night Set - begin set 1 hour after local sunset and finish 1 hour before next sunrise and keep lighting to a minimum	Yes	-	-	-

<sup>2</sup>Removing and splitting swordfish heads, and using heads and livers for strategic offal discards is a requirement for all stern-setting vessels.



**Figure 3.** Illustrated seabird handling guidelines developed for use and distribution in protected species workshops.

## 1.3 Protected Species Workshops

In addition to gear and operational mitigation measures to deter or reduce seabird interactions, owners and operators of pelagic longline vessels must complete a protected species workshop each year (50 CFR 665.814). The workshop includes training in the identification, safe handling, and release techniques for sea turtles, marine mammals, and seabirds (Fig. 3). The workshop also reviews regulatory and compliance requirements. In a classroom setting, fishermen learn from oral presentations, hands-on demonstrations, videos, and printed reference materials. NMFS also offers the workshops on line for those who have taken a classroom workshop within the past three years. A valid workshop certificate is necessary for owners to obtain or renew Federal longline fishing permits. Longline vessel operators must also have on board the vessel a valid protected species workshop certificate issued by NMFS to the operator of the vessel.

In 2018, NMFS PIRO provided protected species workshop

**Table 3.** Hawaii deep- and shallow-set longline fisheries effort and observer coverage, 2017 and 2018.

2018					
Fishery	Number of vessels	Trips	Sets	Hooks	Observer coverage
Deep-set	143	1,642	20,994	58,500,893	20.36%
Shallow-set	11	30	420	486,013	100%

2017					
Fishery	Number of vessels	Trips	Sets	Hooks	Observer coverage
Deep-set	145	1,539	19,674	53,554,046	20.39%
Shallow-set	21	72	1005	1,083,216	100%

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished shallow-set data, 7/24/2019, and NMFS 2019a and NMFS 2019b.

training for 265 Hawaii-based longline vessel owners and operators, and other interested individuals. Another 39 vessel owners, operators, and crewmembers completed the protected species workshop training in American Samoa with assistance from the PIRO Sustainable Fisheries Observer Program.

## 1.4 Fishing Effort and Observer Coverage

Table 3 summarizes effort data from 2017 and 2018 by haul date. From 2017 to 2018, deep-set fishing trips increased by 6.6% and shallow-set fishing trips decreased by 140%.

Please note that other summaries throughout this report and elsewhere may vary slightly depending upon the data source, including revisions. For example, observers may report seabird interactions by date of trip (departure or arrival), set date, or haul date in a given year. NMFS typically bases observer coverage levels on the trip departure date. The NMFS Sustainable Fisheries Observer Program typically bases protected species interactions in their quarterly, semiannual, and annual reports on vessel arrival date <https://www.fisheries.noaa.gov/pacific-islands/fisheries-observers/pacific-islands-longline-quarterly-and-annual-reports>. NMFS also provides summary reports from mandatory logbook data reported by captains.

# 2. Interactions

## 2.1 Species

NMFS observers have recorded the following bird species being hooked or entangled in the longline fisheries since 1994, when NMFS began deploying observers: Laysan albatross (*Phoebastria immutabilis*), black-footed albatross (*P. nigripes*), sooty shearwater (*Puffinus griseus*), unidentified shearwaters, brown booby (*Sula leucogaster*), red-footed booby (*S. sula*), Northern fulmar (*Fulmarus glacialis*), glaucous winged gull (*Larus glaucescens*), and an unidentified gull (Table 4). None of these species is listed under the Endangered Species Act (ESA). Both Hawaii longline fisheries have a low level of interactions with these species. Based on the population estimates, the fisheries likely have very little effect on these populations.

Some seabirds, especially shearwaters, are difficult to identify. Table 5 provides a summary of seabird

specimens that NMFS observers collected for identification and biological study after capture in the Hawaii longline fisheries in 2018. Most seabird specimens are frozen and shipped to the Marine Wildlife Veterinary Care and Research Center in Santa Cruz, California. Since 2007, staff with the organization Oikonos have been collecting morphometric data on shipped specimens.

**Table 4. Species recorded hooked or entangled in Hawaii longline fisheries.**

Species	Global population estimate	Demographic information
Laysan albatross	666,658 breeding pairs (ACAP 2017)	The Northwestern Hawaiian Islands (NWHI) has the world's largest colonies and more than 99% of the global breeding population (ACAP 2012a)
Black-footed albatross	69,969 pairs (ACAP 2017)	More than 95% of the population breeds in the NWHI (ACAP 2012b)
Northern fulmars	20 million individuals (Birdlife 2019a)	Located throughout the North Atlantic and North Pacific
Red-footed booby	More than 1 million birds (Birdlife 2019b)	Winters on tropical islands in most oceans
Brown booby	More than 200,000 adults (Birdlife 2019c)	Located throughout the pan-tropical oceans
Sooty shearwaters	8,800,000 adults (Birdlife 2019d)	Nest in Australia, New Zealand, and southern South America
Glaucous-winged gull	More than 570,000 individuals (Birdlife 2019e)	Located along the Pacific coast of North America to the northern coast of Japan

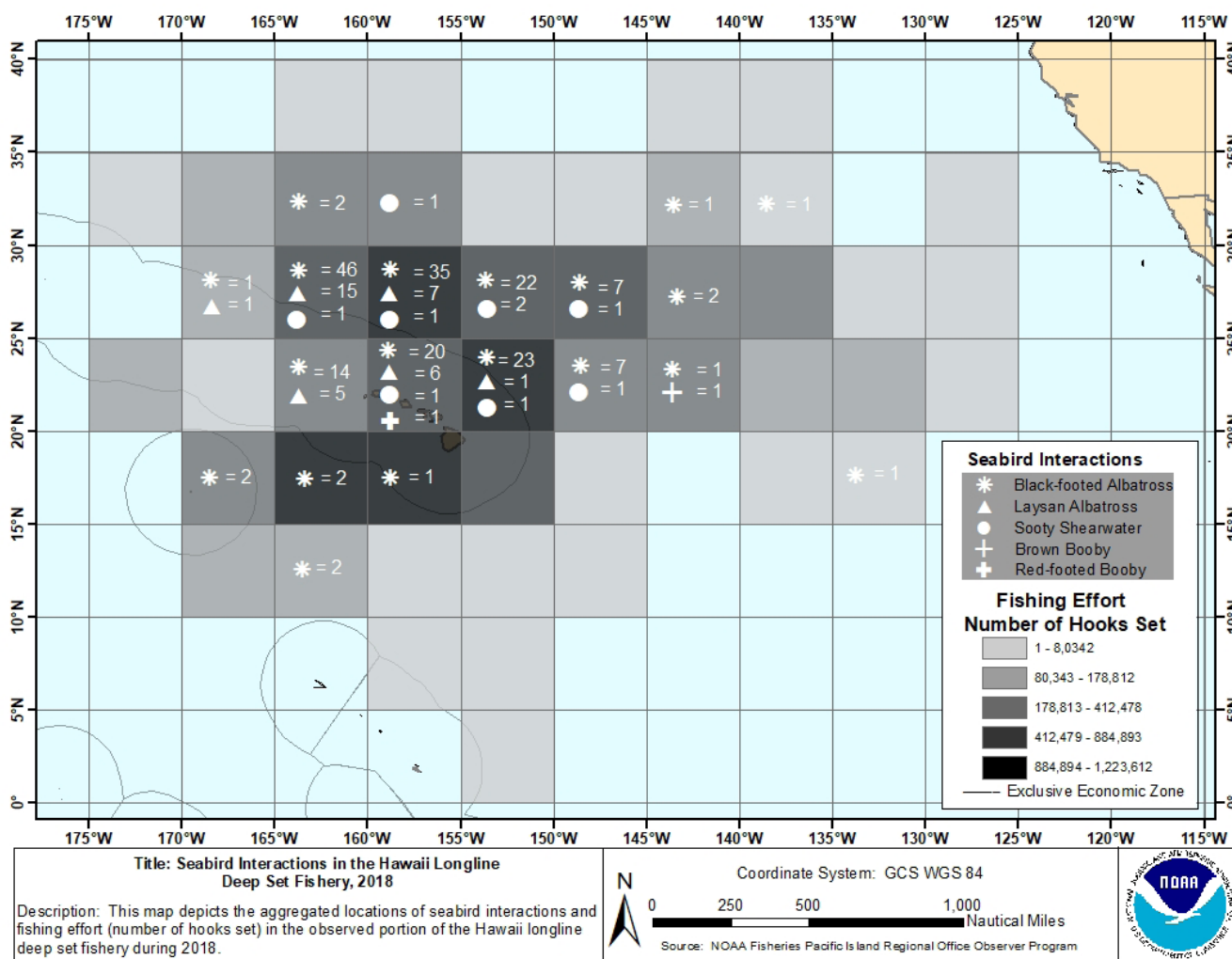
**Table 5. Summary of collected seabirds from the Hawaii longline fisheries, 2018. Note: Not all dead seabirds are collected as specimens.**

Species	Number retained
Black-footed albatross	152
Laysan albatross	25
Sooty shearwater	9
Brown booby	1
Red-footed booby	1

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 7/24/2019.

## 2.2 Location of Interactions

Figs. 4 and 5 show the spatial distribution of observed seabird interactions in deep- and shallow-set fisheries, respectively, based on observations of seabirds in 2018. Most of the interactions occur north of 20° N, where seabirds are typically more abundant, and where fishing effort is more concentrated.

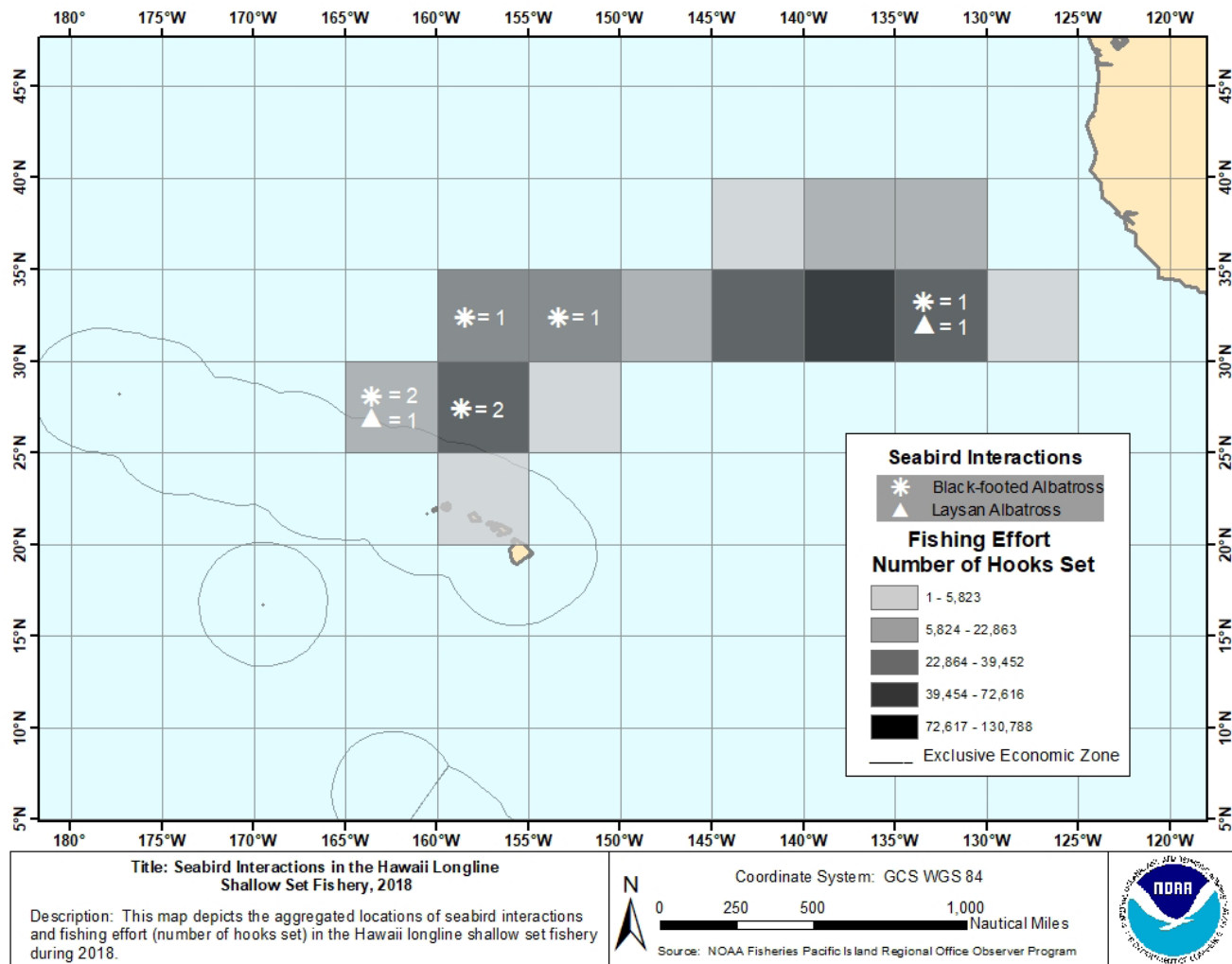


**Figure 4. Locations of seabird interactions observed in Hawaii deep-set longline fishery, 2018.**

*Note: NMFS deployed observers on 20.36% of deep-set trips in 2018.*

*Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 7/24/2019.*





**Figure 5.** Locations of seabird interactions observed in Hawaii shallow-set longline fishery, 2018.

*Note: NMFS deployed observers on every shallow-set trip in 2018.*

*Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 7/24/2019.*

## 2.3 Number of Interactions

Table 6 summarizes the number of observed seabird interactions, and the condition of the seabirds upon release, and fishing effort in both fisheries from 2004 – 2018. During that period, NMFS deployed observers on 100% of shallow-set fishing trips; therefore, the number of interactions shown in Table 6 represents the fishery-wide totals. NMFS deployed observers on 20.36% of deep-set trips in 2018, so we expanded the observed interactions using the observer coverage rate to estimate total interactions (Table 7). Fig. 5 shows the seabird interaction rate from 2004 to 2018 from Table 6. In recent years, the seabird interaction rates have increased.

Almost all interactions in the deep-set fishery occur when fishermen set gear during the day while seabirds are actively feeding. Seabirds may be hooked or entangled, and then drown while the gear sinks. Because most seabirds are inactive at night, very few interactions occur when fishermen typically haul

deep-set gear. In 2018 in the deep-set fishery, observers documented interactions with 35 Laysan albatrosses, 190 black-footed albatrosses, nine sooty shearwaters, one red-footed booby, and one brown booby (Table 6). Nearly all of the seabirds observed to interact with the deep-set fishery were dead (88%). Table 7 contains the total estimated number of interactions with Laysan albatross, black-footed albatross, shearwaters, red-footed booby, and brown booby based on observer records for the deep-set fishery in 2018.

The shallow-set fishery typically sets at night and hauls the gear during the day; therefore, most of the interactions occur when fishermen retrieve the gear and birds are actively feeding. In 2018, the shallow-set fishery interacted with two Laysan albatrosses and seven black-footed albatrosses (Table 6). Fishermen released approximately 78% of seabirds alive.

**Table 6. Numbers of observed seabird catch levels, fishing effort, and interaction rates in the combined Hawaii longline fisheries, 2004-2018.**

### Deep-set Fishery

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species caught	Total birds observed caught	Birds released injured and alive	Birds released dead	Total observed effort (hooks)	Seabird interaction rate (birds per 1,000 hooks observed)
2004	2	5	-	2	9	-	9	7,900,681	0.001
2005	6	11	-	1 <sup>1</sup>	18	-	18	9,360,671	0.002
2006	1	17	5	-	23	-	23	7,540,286	0.003
2007	7	18	-	-	25	-	25	7,620,083	0.003
2008	14	30	14	2 <sup>2</sup>	60	4	56	8,775,951	0.007
2009	18	23	4	-	45	-	45	7,877,861	0.006
2010	39	17	1	-	57	1	56	8,184,127	0.007
2011	32	13	3	-	48	2	46	8,260,092	0.006
2012	31	36	7	-	74	5	67	8,768,728	0.008
2013	48	49	8	-	105	5	100	9,278,133	0.011
2014	12	38	1	-	51	6	45	9,608,244	0.005
2015	25	101	4	2 <sup>4</sup>	132	19	113	9,393,234	0.014
2016	33	104	4	3 <sup>5</sup>	144	7	137	9,882,920	0.015
2017	38	103	-	1 <sup>6</sup>	142	13	129	10,148,195	0.014
2018	35	190	9	2 <sup>8</sup>	236	28	208	11,751,242	0.020

**Shallow-set Fishery**

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species caught	Total birds observed caught	Birds released injured and alive	Birds released dead	Total observed effort (hooks)	Seabird interaction rate (birds per 1,000 hooks observed)
2004	1	-	-	-	1	1	-	76,750	0.013
2005	62	7	-	-	69	47	22	1,328,806	0.052
2006	8	3	-	-	11	5	6	745,125	0.015
2007	40	8	-	-	48	40	8	1,292,036	0.037
2008	33	6	-	-	39	24	15	1,350,127	0.029
2009	81	30	1	-	112	88	24	1,767,128	0.063
2010	40	38	-	<sup>1</sup> <sup>3</sup>	79	61	18	1,828,529	0.043
2011	49	19	-	-	68	53	15	1,611,395	0.042
2012	62	37	-	-	99	77	21	1,418,843	0.070
2013	45	28	2	-	75	48	27	1,000,084	0.075
2014	39	32	1	-	72	56	16	1,509,727	0.048
2015	43	38	-	-	81	65	16	1,286,628	0.063
2016	25	40	-	-	65	50	15	830,177	0.078
2017	6	53	-	<sup>1</sup> <sup>7</sup>	60	38	22	1,051,426	0.057
2018	2	7	-	-	9	7	2	546,371	0.016

<sup>1</sup>brown booby; <sup>2</sup>red-footed booby and unidentified seabird; <sup>3</sup>northern fulmar; <sup>4</sup>red-footed booby and unidentified shearwater;

<sup>5</sup>two red-footed boobies and one unidentified albatross; <sup>6</sup>unidentified gull; <sup>7</sup>glaucous-winged gull; <sup>8</sup>one brown booby and one red-footed booby.

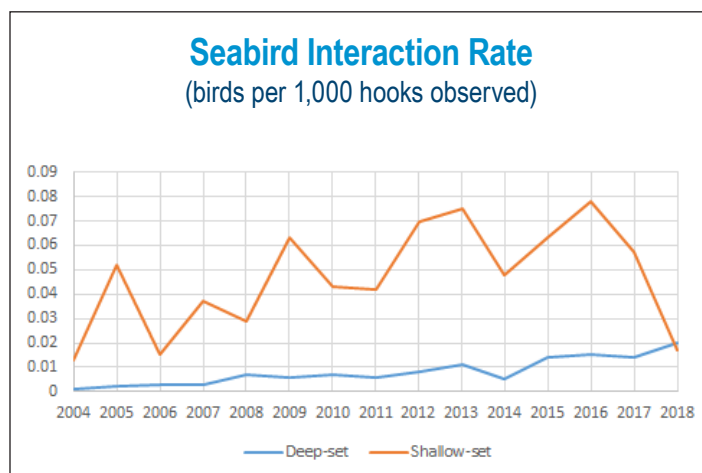
*Note: Sustainable Fisheries Observer Program data (unpublished, 7/24/2019) are based on the date and time of the beginning of the haul, with the exception of the total observed effort (hooks), which is based on arrival date from the Sustainable Fisheries Observer Program annual reports (NMFS 2019c and NMFS 2019d). Interaction rates are calculated and rounded to the nearest thousandths (third decimal) place.*

**Table 7. Estimated total seabird interactions in the Hawaii deep-set longline fishery, 2018.**

Species	Total annual estimate
Black-footed albatross	931
Laysan albatross	157
Shearwaters	40
Red-footed booby	5
Brown booby	6

*Note: Table lists point estimates of the total number of incidental interactions by species in the Hawaii deep-set longline fishery based on observed interactions during 2018. Point estimates are based on the trip arrival date rather than trip haul date. Source: McCracken 2019.*

**Figure 6. Seabird interaction rates in Hawaii deep- and shallow-set longline fisheries, 2004-2018.**





Seabirds can be hooked, entangled, or both. Table 8 provides a summary of capture and release conditions in 2018. Regulations require fishermen to remove as much gear as safely possible from any seabirds captured before the seabirds are released.

**Table 8. Capture and release details by species for seabird interactions in the Hawaii longline fisheries, 2018.**

	Hooked only	Entangled only	Both hooked and entangled	Not known or not recorded
Laysan albatross	26	6	5	0
Black-footed albatross	172	9	15	1
Brown booby	0	0	1	0
Red-footed booby	1	0	0	0
Sooty shearwater	8	0	1	0

*Note: None of the seabirds released alive had any gear attached. Two black-footed albatross (dead) were recorded as hooked, but were unknown if they were also entangled. Included in hooked only column here. Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 7/24/2019.*



*Laysan albatross interacting with a baited hook.*

## Recovered Seabird Bands

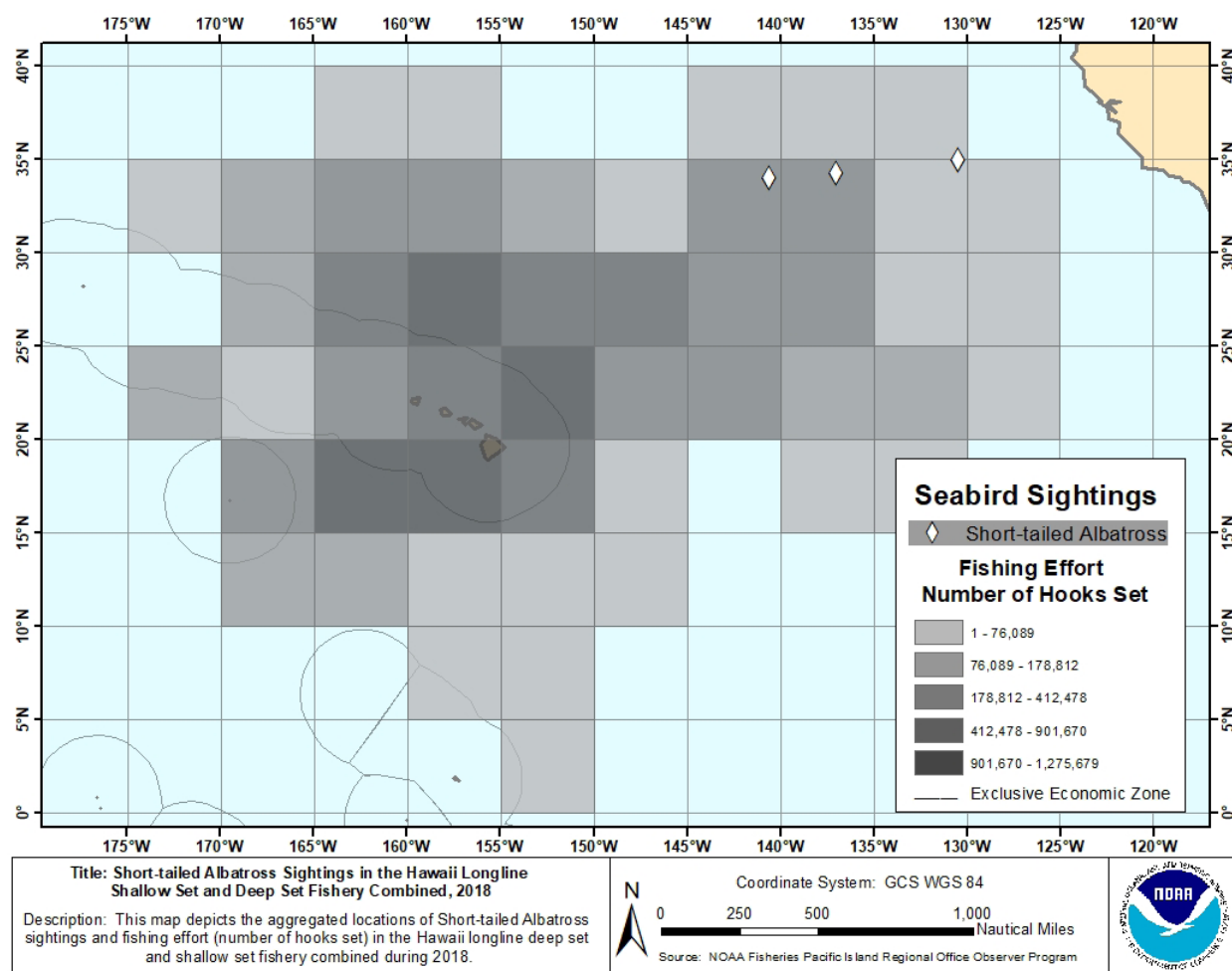
State and Federal agencies and other groups attach identification bands to the legs of birds to study bird movement, survival, and other characteristics. Table 9 provides a summary of observed seabirds with leg bands from Hawaii longline fisheries interactions in 2018. Most of the recovered bands were from albatrosses banded on French Frigate Shoals in the NWHI and caught incidentally in the first half of the year.

**Table 9. Observed interactions of seabirds with bands in Hawaii deep- and shallow-set longline fisheries, 2018.**

Species	Disposition	Band(s) recovery date	Date banded	Location banded	Age at banding (yr)	Age at recovery (yr)
Laysan Albatross	Dead	2/5/2018	6/9/2005	French Frigate Shoals (Tern Island)	<1	13
Black-footed Albatross	Dead	2/9/2018	6/10/2008	French Frigate Shoals (Tern Island)	<1	10
Laysan Albatross	Dead	2/9/2018	6/5/1998	French Frigate Shoals (Tern Island)	<1	20
Black-footed Albatross	Dead	2/13/2018	1/27/2000	French Frigate Shoals (Tern Island)	>1	>18
Black-footed Albatross	Dead	3/1/2018	6/15/2004	French Frigate Shoals (Tern Island)	<1	14
Black-footed Albatross	Dead	3/10/2018	5/24/2007	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	3/22/2018	6/3/2003	French Frigate Shoals (Tern Island)	<1	15
Black-footed Albatross	Dead	3/25/2018	6/5/1996	French Frigate Shoals (Tern Island)	<1	22

Species	Disposition	Band(s) recovery date	Date banded	Location banded	Age at banding (yr)	Age at recovery (yr)
Black-footed Albatross	Dead	3/30/2018	12/29/2008	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Dead	3/22/2018	5/26/2006	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	3/30/2018	6/5/1998	French Frigate Shoals (Tern Island)	<1	20
Black-footed Albatross	Dead	3/24/2018	5/26/2007	French Frigate Shoals (Tern Island)	<1	11
Laysan Albatross	Dead	4/8/2018	1/25/2012	Oahu (Waialua)	<1	6
Black-footed Albatross	Dead	4/23/2018	6/19/2010	French Frigate Shoals (Tern Island)	<1	8
Black-footed Albatross	Dead	5/19/2018	6/8/2002	Kure Atoll (Green Island)	<1	17
Black-footed Albatross	Injured	5/7/2018	5/21/2008	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	5/13/2018	5/30/1999	French Frigate Shoals (Tern Island)	>1	>28
Laysan Albatross	Dead	5/22/2018	6/8/2002	French Frigate Shoals (Tern Island)	<1	17
Black-footed Albatross	Dead	5/18/2018	1/6/2005	French Frigate Shoals (Tern Island)	>1	>13
Black-footed Albatross	Dead	5/19/2018	6/9/2007	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	5/20/2018	6/13/2006	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	5/20/2018	6/8/2007	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	5/24/2018	5/18/2010	French Frigate Shoals (Tern Island)	<1	8
Black-footed Albatross	Injured	5/25/2018	12/23/1997	French Frigate Shoals (Tern Island)	<1	21
Laysan Albatross	Dead	5/25/2018	6/4/2003	French Frigate Shoals (Tern Island)	<1	15
Black-footed Albatross	Dead	6/7/2018	6/15/2007	Laysan Island	<1	11
Black-footed Albatross	Dead	6/26/2018	6/9/2004	French Frigate Shoals (Tern Island)	<1	14
Black-footed Albatross	Dead	6/23/2018	6/9/2004	French Frigate Shoals (Tern Island)	>1	>14
Black-footed Albatross	Dead	6/19/2018	5/29/2007	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	6/7/2018	6/15/2007	Laysan Island	<1	11
Laysan Albatross	Dead	11/13/2018	5/23/2008	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Dead	11/15/2018	6/5/2006	French Frigate Shoals (Tern Island)	<1	12
Laysan Albatross	Dead	12/17/2018	2/1/2018	Zapato (S of Guadalupe Island), MX	<1	1
Laysan Albatross	Dead	12/18/2018	1/11/2005	French Frigate Shoals (Tern Island)	>3	>16

Source: USGS, USFWS, and NMFS, unpublished data, received 7/24/2019.



**Figure 7.** Short-tailed albatross sightings and fishing effort in Hawaii deep- and shallow-set longline fisheries, 2018.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 12/13/2019.

### 3. ESA Listed Seabirds

There have been no observed interactions (hooking or entanglement) between the fisheries and any ESA-listed seabirds. The distributions of three seabird species that are protected under the ESA overlap with the areas where the Hawaii longline fisheries operate: the endangered short-tailed albatross and Hawaiian dark-rumped petrel (*Pterodroma sandwichensis*), and the threatened Newell's shearwater (*Puffinus newelli*). There were two sightings of short-tailed albatross on shallow-set trips in 2018 and one on an observed deep-set trip. Fig. 7 shows the locations of these sightings compared to the observed fishing effort.



A rare sighting of a short-tailed albatross.



## 4. Management

In May 2015, consistent with the Migratory Bird Treaty Act, the USFWS issued a Special Purpose Permit to NMFS for the shallow-set fishery. The permit authorized the incidental take of a limited number of migratory birds in the shallow-set fishery until March 31, 2018. The permit included short-tailed albatross, black-footed albatross, Laysan albatross, sooty shearwater, and northern fulmar. In December 2017, the U.S. 9th Circuit Court of Appeals reversed a District Court's judgment affirming FWS's decision to issue the Special Purpose Permit to NMFS (*Turtle Island Restoration Network; Center for Biological Diversity vs. National Marine Fisheries Service, 12-cv-00594, D-Haw*). Specifically, the 9th Circuit Court concluded that the FWS's grant of an incidental take permit to the NMFS in reliance on the "special purpose permit" provision in 50 CFR. § 21.27 was arbitrary and capricious because the FWS's interpretation of § 21.27 does not conform to either the MBTA's conservation intent or the plain language of the regulation. The Court explained its conclusion by discussing the other "form" permits authorized under the MBTA for discrete types of takings (scientific collection, taxidermy, and rehabilitation), and then stated that the FWS's new interpretation of § 21.27's special purpose activity exception as applying to basic commercial activities like fishing that have no articulable special purpose is, therefore, inconsistent with the existing permitting scheme that the FWS has enacted.

## 5. Research

### Shallow-set Fishery

Effective management in the Hawaii shallow-set fishery has greatly reduced seabird interactions, primarily through mitigation measures required during gear setting. Since effective implementation of these measures in 2001, approximately 75% of the remaining seabird interactions occur during gear hauling (Gilman et al. 2014). Because most shallow-set fishermen choose the option to stern set at night, they haul their gear primarily during the day when seabirds are more likely to be foraging. In a review of observer

data from 2004 to 2012, Gilman et al. (2014) found an increasing temporal trend of albatrosses attending vessels during hauling, which may have been one of the factors that results in the observed increasing trend in the seabird standardized haul catch rate during this time.

The highest relative standardized seabird catch rates from January through March corresponded with brooding and chick rearing for mature Laysan and black-footed albatrosses, when the albatrosses forage in areas that overlap with the shallow-set fishery. The lowest live seabird catch rates occurred during the non-breeding season in August and September, when albatross foraging areas overlap less with the fishery (Gilman et al. 2014).

### Deep-set Longline Fishery

Since NMFS introduced seabird regulations in 2001 in the Hawaii deep-set fishery, the overall seabird catch rate had declined. However, catch levels of the black-footed albatross have been steadily increasing in the Hawaii deep-set longline fishery over the past decade. In November 2017, the WPFMC in coordination with NMFS Pacific Islands Regional Office and Pacific Islands Fisheries Science Center, convened a workshop to explore the potential drivers, and implications of the higher albatross interaction rates observed in 2015–2016, in the context of longer-term oceanographic variability, shifts in fishery effort and distribution, changes in albatross at-sea distribution, and albatross demography and population trends. The rise in catch rates may have been due to variability in the temporal and spatial distribution of fishing effort, a unique captain effect (i.e., seabird catch rates are significantly explained by which person is the captain), an increase in the number of albatrosses attending Hawaii longline vessels, and a shift in the relative use of seabird bycatch mitigation methods. There was also increased use of blue-dyed fish bait and decreased use of the more effective side setting. While the black-footed albatross population size has not changed significantly in the last decade, their distribution and attendance at longline vessels changed in response to inter-annual (El Niño – Southern Oscillation) and decadal (Pacific Decadal Oscillation) climate variability in the north Pacific Ocean (WPFMC 2018).

In September 2018, the WPFMC held a workshop to review seabird bycatch mitigation measures in the longline fisheries. Participants evaluated the relative promise of a comprehensive suite of alternative seabird bycatch mitigation methods for use in Hawaii's longline fisheries. These included methods currently prescribed in the Hawaii longline seabird regulations, seabird measures adopted by Pacific tuna regional fisheries management organizations (Inter-American Tropical Tuna Commission, Western and Central Pacific Fisheries Commission) and methods identified as best practice by the Agreement for the Conservation of Albatrosses and Petrels. Participants reviewed 35 measures designed to mitigate seabird bycatch and assessed them against criteria on efficacy, cross-taxa conflicts, practicality, economic viability, safety, durability and ability to facilitate compliance monitoring (WPFMC 2018).

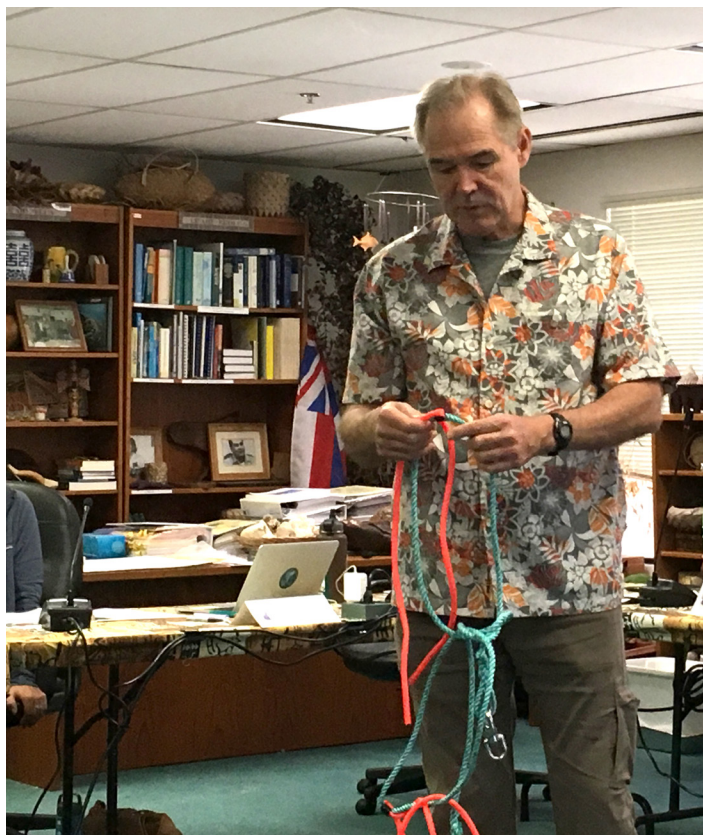
Workshop participants recognized that combinations of methods are prescribed, in Hawaii and elsewhere, to obtain desired reductions in seabird bycatch rates. Participants identified tori (streamer) lines, which are not part of the Hawaii seabird regulations, as having high potential for use in Hawaii's deep-set longline fishery as they are likely to be highly effective and potentially more practical to use than existing regulatory options. Tori lines, which were tested in Hawaii's fisheries in 1999 prior to the adoption of seabird regulations, were not considered practical at that time due to gear entanglement problems. Subsequently, through trials and broad industry use of tori lines in other longline fisheries, researchers have identified tori line designs and materials that reduced the incidence of entanglement with gear and improved durability. Participants agreed that tori line trials in Hawaii and development of minimum standards would now be useful (WPFMC 2018).

At the October 2018 meeting, the Council received a report of the September 2018 Workshop and recommended:

1. Enhance outreach and training efforts to ensure proper application of existing seabird mitigation measure requirements;
2. NMFS provide support for research and development for alternative measures with potential to replace blue-dyed bait, with high

priority placed on identifying suitable designs for tori lines; and

3. Encourage submission of Experimental Fishing Permit applications for testing alternative measures without the use of blue-dyed bait to allow comparison of measure effectiveness with and without blue-dyed bait.



*Ed Melvin, formerly with Washington Sea Grant and affiliate professor at the University of Washington at the September 2018 workshop demonstrating tori lines utilized in the Alaskan and West Coast bottom longline fisheries.*



*Blue-dyed bait being prepared.*

## 6. Summary

Table 10 compares the 2017 and 2018 observed interactions in the two fisheries. The observed interactions and interaction rate from 2017 to 2018 increased for the deep-set fisheries and decreased for the shallow-set fishery. In 2017, the shallow-set fishery interacted with 60 seabirds (six Laysan albatrosses, 53 black-footed albatrosses, and one glaucous winged gull). In 2018, the shallow-set fishery interacted with nine seabirds (two Laysan albatrosses and seven black-footed albatrosses). In 2017, observers in the deep-set fishery documented interactions with 142 seabirds (38 Laysan albatrosses, 103 black-footed albatrosses, and one unidentified gull). In 2018, observers in the deepset fishery documented interactions with 236 seabirds (35 Laysan albatrosses, 190 black-footed albatrosses, nine sooty shearwaters, one brown booby, and one red-footed booby) (see Table 6).

**Table 10. Comparison of observed interactions in Hawaii longline fisheries, 2017 and 2018.**

Observed Interactions	2017	2018	% Change
Seabirds observed in deep-set fishery	142	236	66%
Seabirds observed in shallow-set fishery	60	9	-85%
Deep-set interaction rate (birds per 1,000 hooks observed)	0.014	0.020	43%
Shallow-set interaction rate (birds per 1,000 hooks observed)	0.057	0.016	-72%

*Note: There was 20.36% and 20.39% observer coverage in the deep-set longline fishery in 2017 and 2018, respectively, and 100% coverage in the shallow-set longline fishery.*

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